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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,265	10/07/2008	Pierre Richaud	RICHAUD1	6451
1444 7590 08/31/2011 Browdy and Neimark, PLLC 1625 K Street, N.W. Suite 1100 Washington, DC 20006			EXAMINER IBRAHIM, MEDINA AHMED	
			ART UNIT	PAPER NUMBER
			1638	
			MAIL DATE	DELIVERY MODE
			08/31/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/593,265

Applicant(s)

RICHAUD ET AL.

Examiner

MEDINA A. IBRAHIM

Art Unit

1638

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1,2 and 4-34 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1,2 and 4-34 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-850)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____
- Paper No(s)/Mail Date 06/15/2011

DETAILED ACTION

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Applicant's response filed 06/15/2011 in reply to the Office action of 02/15/2011 has been considered. Claims 1-2, 4-17, 20-22, and 25 are amended. Claim 3 is cancelled. New claims 29-34 are added. Therefore, claims 1-2 and 4-34 are pending and are examined.

All previous objections and rejections not set forth below have been withdrawn in view of Applicant's amendment and/or arguments.

Claim Rejections - 35 USC § 103

Claims 1-2 and 4-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borremans et al (EP 1 136 558 A1; published 22 March 2000) in view of Bernard et al (WO 2004078905 A2; published September 16, 2004) and Chaney et al (US 5, 944, 872). This rejection is repeated for the reasons of record as set forth in the last Office action of 02/15/2011. Applicant's arguments filed 06/15/2011 have been fully considered but are not deemed persuasive.

Applicant argues that the claims are amended to recite the genetically modified plants overexpress two different eukaryotic P18 type Atpase of the heavy metals zinc-cobalt/cadmium-lead subclass and are able to accumulate heavy metals, useful of phytoremediation and said heavy metals from contaminated environment. Applicant argues that Borremans discloses genetically modified plants expressing at least one heterogenous P-type ATPase of prokaryotic origin and only of the Cu classes of

eukaryotic origin. Applicant also argues that Bernard discloses cDNAs from *Thlaspi caerulescens* encoding proteins involved in cadmium tolerance that includes phytochelation synthase 1 and P-type ATPase or the Cd²⁺/Zn²⁺ subclass and a method for producing transgenic plants expressing a maximum of 4 genes of *T. caerulescens* related to cadmium tolerance and testing the plants for their phytoextraction capacities, but neither discloses nor suggests specific combinations of these genes or the combination of two different P-type ATPases. Applicant further argues that Chaney merely discloses a method for phytoextracting nickel and cobalt from soil by cultivating Alyssum plants in the soil. Applicant also argues that example 3 of the instant application shows coexpression of AtHMA4 and AtHMA3 in a transgenic Arabidopsis thaliana plant tolerate heavy metal toxin concentrations over a longer period of time. Therefore, Applicant contends that none of the cited patents, alone or in combination, suggests genetically modified plants synergistically overexpressing two different eukaryotic P1B type ATPases of the Zn²⁺+Co²⁺/Cd²⁺+pb²⁺ subclass.

These are not found persuasive for the following reasons: firstly, since the rejection is one of obviousness and not one of anticipation none of the cited references needs to teach two different eukaryotic P18 type Atpase of the heavy metals zinc-cobalt/cadmium-lead subclass. Secondly, Borremans et al is relied upon because it provides transformed plants expressing at least one heterogonous P-type ATPase of eukaryotic origin , wherein the transformed plant/plant cells show improved heavy metal tolerance which allow phytoextraction of heavy metals and improved heavy metal accumulation. Borremans et al also provides the motivation to use P-type Atpase

proteins encoding genes, including the ZntA gene to produce transgenic plants with heavy metal tolerance and accumulation activity because P-type ATPase genes provide tolerance to multiple toxic trace elements such as Cu, Cd, Pb, Zn and Ag. Bernard et al is relied upon because it provides tobacco plants transformed with cadmium/zinc transporting P-type ATPase gene designated as TcHMA4 and AthMA4 which confers heavy metal accumulating activity and the use of said transgenic plants for phytoremediation of heavy metal contaminated soils and/or phytoextraction of heavy metals from said soils as well as other genes such as phytochelatin synthase which can be used for metal detoxification. Chaney et al is relied upon because it provides phytoremediation/phytoextraction methods that involve harvesting leaf tissues that accumulated the heavy metals; and recovering the metal by drying and reducing to an ash the harvested leaves. Thirdly, the prior art is replete with genes encodes P-type ATPase genes of both prokaryotic and eukaryotic origin and their use with other heavy metal tolerance genes to produce transgenic plants for phytoremediation as evidenced by each of Borremans et al and Bernard et al above. Applicant provides no unexpected results associated with the use of eukaryotic P-type ATPase genes that could not have been obtained with the prokaryotic P-type Atpase genes. In addition, the claims do not recite specific concentrations of extracted heavy metals that would distinguish from the prior art. Furthermore, it would have been obvious to a person of ordinary skill in the art to combine any two different p-type ATPase genes known in the prior and use them for plant transformation given that Borremans et al also provides the motivation to use P-type Atpase proteins encoding genes, to produce transgenic plants with heavy metal

tolerance and accumulation activity because P-type ATPase genes provide tolerance to multiple toxic trace elements such as Cu, Cd, Pb, and Zn. Therefore, for all the reasons discussed above and in the last Office action, the rejection is proper and is maintained.

In *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1396 (2007), the Supreme Court particularly emphasized “the need for caution in granting a patent based on the combination of elements found in the prior art,” *Id.* at ___, 82 USPQ2d at 1395, and discussed circumstances in which a patent might be determined to be obvious. Importantly, the Supreme Court reaffirmed principles based on its precedent that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *Id.* at ___, 82 USPQ2d at 1395.

The Supreme Court further stated that:

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Id.* at ___, 82 USPQ2d at 1396.....When considering obviousness of a combination of known elements, the operative question is thus “whether the improvement is more than the predictable use of prior art elements according to their established functions.” *Id.* at ___, 82 USPQ2d at 1396.

Remarks

No claim is allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEDINA A. IBRAHIM whose telephone number is (571)272-0797. The examiner can normally be reached on M-TH 8:00 am to 5:30 PM, and every other Friday from 8:00 AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on 571-272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MEDINA A IBRAHIM/
Primary Examiner, Art Unit 1638